UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/766,123	01/18/2001	Jau-Yuen Chen	AP101HO	1156

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EPSON RESEARCH AND DEVELOPMENT INC
INTELLECTUAL PROPERTY DEPT
150 RIVER OAKS PARKWAY, SUITE 225
SAN JOSE, CA 95134

EXAMINER
LAROSE, COLIN M

ART UNIT	PAPER NUMBER
2623	7

DATE MAILED: 05/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 February 2004*.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-12,14-20 and 22-24* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-12,14-20 and 22-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Arguments and Amendments

1.   Applicants' amendments and/or arguments filed 25 February 2004, have been entered

and made of record.

Response to Amendments and Arguments

2.   Applicant's arguments regarding newly amended claims 1, 9, and 17 have been

considered.

The Lee reference is believed to disclose the added limitation of: "applying a two-

dimensional mask that is divided into a plurality of quadrants, the center of the two-dimensional

mask being common to each of the quadrants." As previously noted in paper 6 for claims 5, 13,

and 21 (which have all been canceled by way of amendment), Lee discloses a 5x5 mask for

checking the classification of a pixel. The 7x7 mask comprises four 4x4 quadrants that all

overlap the center pixel.

Applicant has also clarified that the screen pixel is defined as a pixel being a part of a

predetermined periodic pattern. Lee's "halftone" pixels are believed to correspond to Applicant's

"screen" pixels. However, Lee does not expressly disclose that his halftone pixels are part of

periodic patterns. U.S. Patent 4,773,734 by Inoda is applied below to show that, conventionally,

halftone regions are those regions of an image that exhibit a periodic pattern due to the

application of a screen having a periodic pattern and that the distinction between a "halftone"

pixel and a "screen" pixel is not substantive.

Claim Objections

3.   Claims 7 and 23 objected to because of the following informalities:

The "selectively applying" step/instruction should be -- (d) -- rather than "(e)".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4.   The text of those sections of Title 35, U.S. Code not included in this action can be found

in a prior Office action.

5.   Claims 1, 4, 7-9, 12, 15-17, 20, 23, and 24 are rejected under 35 U.S.C. 103(a) as being

unpatentable over U.S. Patent 6,160,913 by Lee et al. ("Lee") in view of U.S. Patent 4,773,734

by Inoda.

Regarding claims 1, 9, and 17, Lee discloses a method/apparatus/computer program

(figure 1) for removing image artifacts from a representation of an image comprising the steps

of:

a) obtaining a pixel representation of the image (12: greyscale image data is obtained);

b) classifying each pixel in the image as a screen or non-screen pixel (figure 4 is a

detailed flowchart of block 16: in block 402, pixels are classified as halftone (screen) or

continuous tone (non-screen) pixels);

c) examining pixels in a predetermined surrounding area of each pixel to check the

classification of that pixel as determined in step (b) (406, figure 4: pixels are re-classified as

halftone or continuous tone using a 7x7 moving window) by applying a two-dimensional mask

that is divided into a plurality of quadrants, the center of the two-dimensional mask being

common to each of the quadrants (the 7x7 mask comprises four 4x4 areas that all overlap the center pixel – i.e. each of the 4x4 areas originate at a different corner of the 7x7 mask);

d) selectively applying a low pass filter to pixels in the image, such that, when the low pass filter is applied, one or more pixels covered by the low pass filter are respectively replaced by one or more other pixels covered by the low pass filter based on the examining in step c (24, figure 1 and column 9, lines 7-24: the low pass median filter is selectively applied to the image based on the final classification of the pixels as determined in step c – the filter is only performed on the halftone (i.e. screen) pixels; the median filter replaces the center pixel with the pixel value of the median pixel (which, for a binary median filter, corresponds to the value of the majority of the pixels within the filter window)).

Lee does not expressly disclose the halftone pixels are part of periodic patterns, as claimed.

Inoda, in a disclose of prior art, describes a conventional method by which halftone images are created (see description with respect to figure 1). In particular, the method involves applying a light signal through a contact screen having a vignetted dot pattern (column 1, lines 48-52), and the screen consists of a periodic pattern (column 1, lines 64-68). Application of the screen creates a halftoned image (column 2, lines 24-31), which includes periodic patterns that may be large enough to produce undesirable moiré effects (column 2, lines 49-52).

As shown by Inoda to be conventional in the art, halftone images are produced by screens with periodic patterns. The resulting halftone images also exhibit the periodic pattern introduced by the screen, and pixels in the halftone regions are necessarily a part of periodic patterns.

It would have been obvious to one of ordinary skill in the art at the time of the invention

that Lee's "halftone" pixels are part of predetermined periodic patterns, since Inoda teaches that

conventionally, halftone regions exhibit periodicity as a result of screening.

Regarding claims 4, 12, and 20, Lee discloses in the examining step (c), the 2-d mask is

applied such that it is centered on the pixel being checked (406, figure 4: the 7x7 mask is

centered on a pixel of interest).

Regarding claims 7, 15, and 23, Lee discloses that the selectively applying step comprises

selectively applying the low pass filter based on which of the plurality of quadrants in the 2-d

mask contains screen pixels (24, figure 1 and column 9, lines 7-24: the low pass median filter is

selectively applied to the image based on the final classification of the pixels as determined in

step c; and the final classification is based on which of the mask areas (quadrants) contain screen

pixels, and more particularly, which areas (quadrants) contain a certain number of screen pixels –

610, figure 8: the number of screen pixels in the window determines whether the center pixel is

labeled as screen or non-screen).

Regarding claims 8, 16, and 24, Lee discloses

f) determining a feature indicator for at least a portion of the image (block 16 of figure 1

produces a halftone region map, which indicates features of the pixels in the image – i.e.

indicates which pixels are halftone (screen) pixels); and

g) adaptively softening the at least one portion of the image based on the determined

feature indicator (24, figure 1: the portions of the image indicated as halftone are softened).

6.   Claims 2, 3, 6, 10, 11, 14, 18, 19, and 22 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Lee in view of Inoda, and further in view of U.S. Patent 4,194,221 by Stoffel.

Regarding claims 2, 10, and 18, Lee discloses the classifying step (b) comprises applying

a two-dimensional mask of a predetermined size centered on the pixel being classified to

determine if the center pixel is part of the predetermined periodic pattern (402, figure 4: a 5x5

mask is applied to determine if the area is a halftone area and therefore is a part of a periodic

pattern).

Lee is silent to the mask being one-dimensional, as claimed.

Stoffel discloses an image processing system (figure 3) that, akin to Lee, involves

detecting halftone regions. In particular, Stoffel discloses an autocorrelator (22) that employs a

one-dimensional mask centered around a pixel of interest (P_4). The autocorrelator mask is

utilized for detecting regions of halftone (column 3, lines 62-68).

It would have been obvious to one of ordinary skill in the art at the time of the invention

to modify Lee and Inoda by Stoffel to achieve the claimed invention by utilizing a one-

dimensional mask rather than a two-dimensional mask, since Lee and Stoffel are directed to the

same field of endeavor, and Stoffel teaches that one-dimensional masks are effective in detecting

halftone regions.

Regarding claims 3, 11, and 19, Stoffel's one-dimensional mask is divided into a plurality

of overlapping areas, the center pixel being in each of the overlapping areas (22, figure 3:

autocorrelation mask is comprised of a plurality of pixel groups that overlap the center pixel P_4,

such as [P_7 P_6 P_5 P_4] and [P_4 P_3 P_2 P_1]).

Regarding claims 6, 14, and 22, Lee does not expressly disclose the halftone regions have

a periodic line or dot pattern having a period of 2 or 3, however, it is apparent that Lee and

Stoffel's systems are operative to detect halftone patterns with a period of 2 or 3. Figures 6 and 7

show pixel patterns that Lee classifies as "non-halftone" since they contain at least three

consecutive black pixels. All pixel patterns that contain less than three consecutive pixels are

classified as "halftone". Since Lee's system utilizes a window that is only five pixels wide, it is

suitable for detecting halftone patterns with small periods, such as 2 or 3 (i.e. one or two white

pixels in between two black pixels). Similarly, Stoffel's one-dimensional mask is large enough to

detect patterns with periods of 2 or 3. The exact frequency of the halftone region depends on the

characteristics of the inputted image and does not impinge on the operation of Lee or Stoffel's

system.

Conclusion

7.   Applicant's amendment necessitated the new ground(s) of rejection presented in this

Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

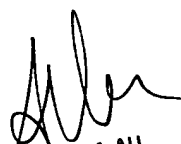CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this

final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489.

The examiner can normally be reached Monday through Thursday from 8:00 to 5:30. The

examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the

organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the TC 2600 Customer Service Office whose telephone number is (703)

306-0377.

AMELIA M. AU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

CML
Group Art Unit 2623
4 May 2004